Long-term clinical success in the management of compromised intertooth spaces utilizing small-diameter implants

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Management of edentulous sites in the oral cavity with dental implants has been well documented in dental literature during the past 25-plus years. The patient may seek tooth replacement for partial or totally edentulous situations where it is difficult to ascertain a denture or implant restoration from a tooth restoration. Using dental implants to replace the natural tooth system in the esthetic zone has also been an increase in restorative treatment plans and, with the advent and perfection of immediate restoration protocols, became standard of care.67

Achieving natural soft-tissue esthetics around dental implants can be predictable and successful. However, certain clinical situations can complicate or negate the procedure altogether.

One of these complications is insufficient intertooth spacing between natural teeth and, most commonly, with concomitantly missing lateral incisors following orthodontic treatment. Often as a solution to this, the dentist chooses a removable partial denture or some type of resin-bonded bridge, both of which may not be appealing to younger individuals. In extreme cases, the dentist may elect to proceed with a fixed bridge, which would cause excessive destruction to the natural teeth serving as abutments and, for a young individual, this could be devastating to these teeth during a 40-50 year period, if not sooner. To properly form an ovate pontic type emergence profile in the soft tissue, which is required for a fixed bridge to have a natural clinical appearance, consideration must be given to the intertooth edentulous space. This is also very important when choosing dental implants for natural tooth replacement. Wallace, Misch and Salama, et al stated that for a normal two-piece implant, the implant should be placed at least 15 mm from the adjacent teeth. As a result, using a 3.5 mm diameter implant, the minimum intertooth space to support proximal bone and natural soft tissue papillary contours should be 6.5 mm, and with a 3.0 mm diameter implant, 6.0 mm for the edentulous space. Often, the intertooth space in these types of cases is smaller than 6.0 mm. Taking these parameters into account, small-diameter implants (3.0 mm is the smallest from most dental implant manufacturers) should not be used in cases with less than 6.0 mm of intertooth space, to prevent potential tooth root damage, crestal bone loss and unnatural-appearing gingival tissues and papillae. Small-diameter, or mini, implants were developed more than 20 years ago and, initially, the recommended use was to support temporary removable prostheses during the healing phase for advanced bone-grafting procedures and/or conventional implant placement.19

Their use was later expanded into immediate conversion of full dentures into implant-supported dentures, support for partially edentulous cases and for anchorage of single tooth implant restorations in compromised intertooth spaces.31-33

Implants are available from 3.8 mm diameter to 2.8 mm diameter and offer a fixed permanent tooth replacement option for patients who otherwise would not be able to have implants placed and restored. Their ease of use and atrophic placement utilizing a flapless approach, with only one coring procedure, as well as simpatic tooth replacement and provisional construction make the use of these implants in the aforementioned sites a must for the dental implant practice.

The following case report will demonstrate the use of the Dentatus ANEW (Dentatus USA, Ltd, New York, NY) implant for the management of the compromised, congenitally missing lateral incisor space in a 17-year-old young woman with a 10-year clinical follow up.

Case report A 17-year-old, non-smoking female presented for tooth replacement in the congenitally missing maxillary left lateral incisor site (Fig. 9). The patient had recently completed orthodontic therapy, and the orthodontist and general practitioner had agreed this was the final obtainable result in regard to the remaining intertooth space between the maxillary left central incisor and maxillary left canine.

The resultant intertooth space was less than 5.0 mm, and conventional two-stage implants with abutment options were ruled out. The patient and her parents ruled out conventional tooth-replacement procedures and chose the minimally invasive procedure, a small-diameter implant, 1.8 mm in diameter, which would allow for natural papillary contours to be developed.

After administration of an appropriate local anesthetic, an ovate pontic contour was created utilizing a football-shaped diamond in the attached, keratinized tissue of the edentulous site (Fig. 3). This sculp-ted type tissue contour helps in the creation of the natural-appearing papillary contours.

The small-diameter implant chosen, a 1.8 mm x 14 mm Dentatus ANEW Implant was then placed after a single coring of the site with a 1.4 mm needlepoint CePo to full depth, within the sculpted tissue emergence profile previously created (Fig. 4). Conversion to an esthetic provisional restoration was completed by placing an abutment coping with a delrin retention screw (Dentatus USA, New York, N.Y.). An interim provisional crown was then followed out and retaught to the abutment coping with a flowable composite. The margins of the provisional were corrected and proofed out prior to the retentive porcelain. The restoration was polished and seated with the set screw from the initial. The immediate postoperative clinical view is seen in Fig. 5. The immediate postoperative periapical view is seen in Fig. 6.

The patient then went through the three-month healing and observation phase prior to construction of a lab-provided provisional implant (Fig. 7). One year later, the patient underwent final restoration fabrication at the left lateral incisor site. A 10-year postoperative clinical image is seen in Fig. 8 and a 10-year postoperative CT scan of the implant in Fig. 9.

Please note the beautiful soft-tissue esthetics that were obtained and excellent maintenance of the crestal and lateral contours.

Conclusion The management of compromised intertooth spaces presents a challenge for the contemporary dental implant team. These spaces have limits on how they are handled and require implants 3.0 mm wide or less, as was demonstrated in the text of this article. Availability of smaller-diameter implants allows patients who normally would have to proceed with a fixed bridge, or resin-bonded bridge, the luxury of dental implants with no preparation and/or reduction to the adjacent natural dentition.

Proper placement procedures and restorative techniques can lead to very esthetic results, allowing for natural tissue contours and emergence profile formation, reminiscent of the natural tooth.

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References
Fig. 7. Lab-processed, long-term provisional restoration

Fig. 8. 10-year postoperative clinical view

Fig. 9. 10-year postoperative CT serial view

Fig. 5. Immediate postoperative clinical view

Fig. 6. Immediate postoperative radiograph

Fig. 8. 15-year postoperative clinical view

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